European Commission

Managing risk in the dairy sector: how futures markets could help

Expert Group on Agricultural Commodities Derivatives and Spot Markets

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Analysis and Outlook
DG Agriculture and Rural Development
European Commission

Agriculture and Rural Development

Outline

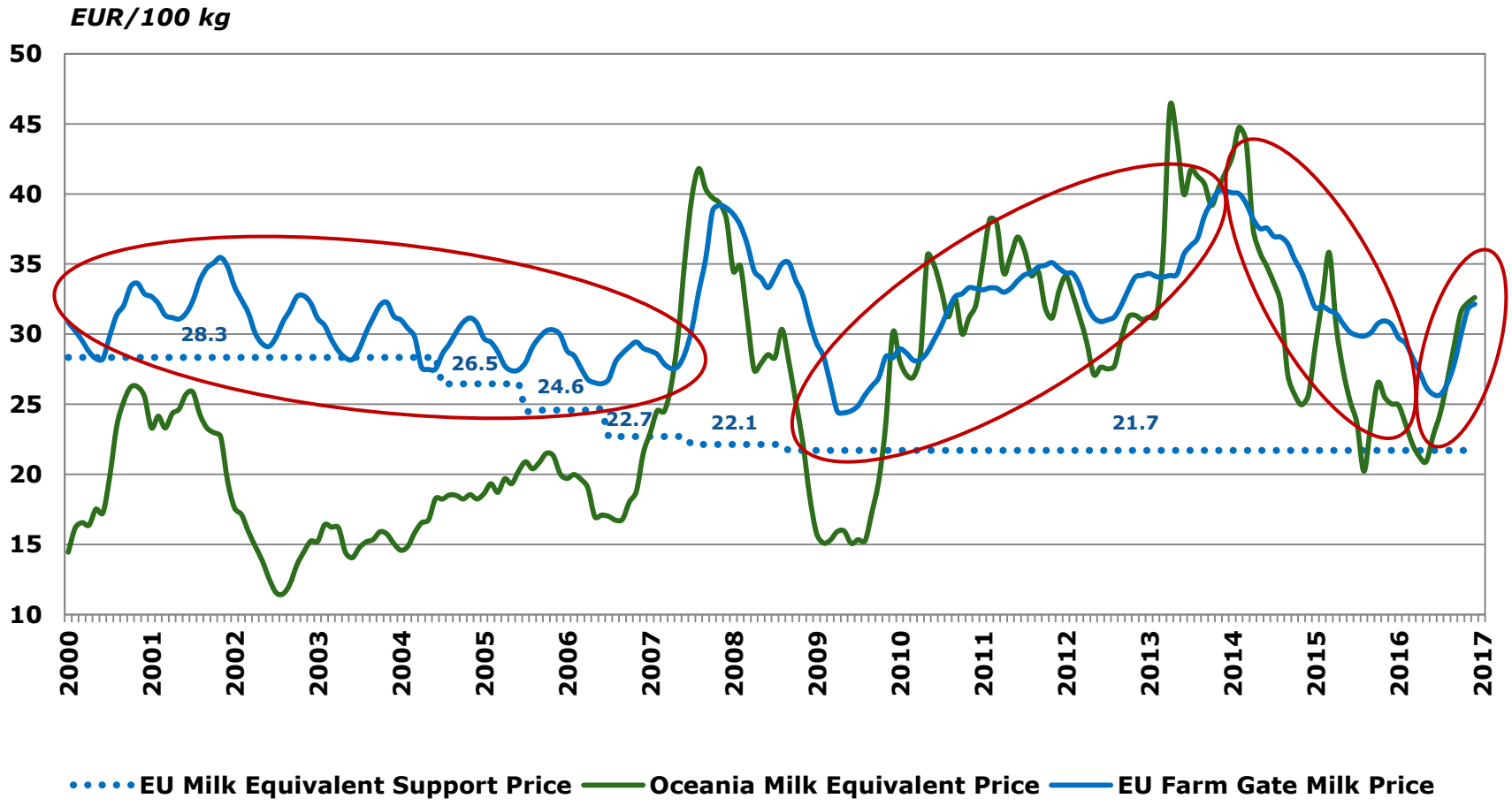
1. Price volatility vs price levels

2. Financial instruments

3. Use of dairy futures in EU, US and NZ

4. Obstacles to the growth of future markets

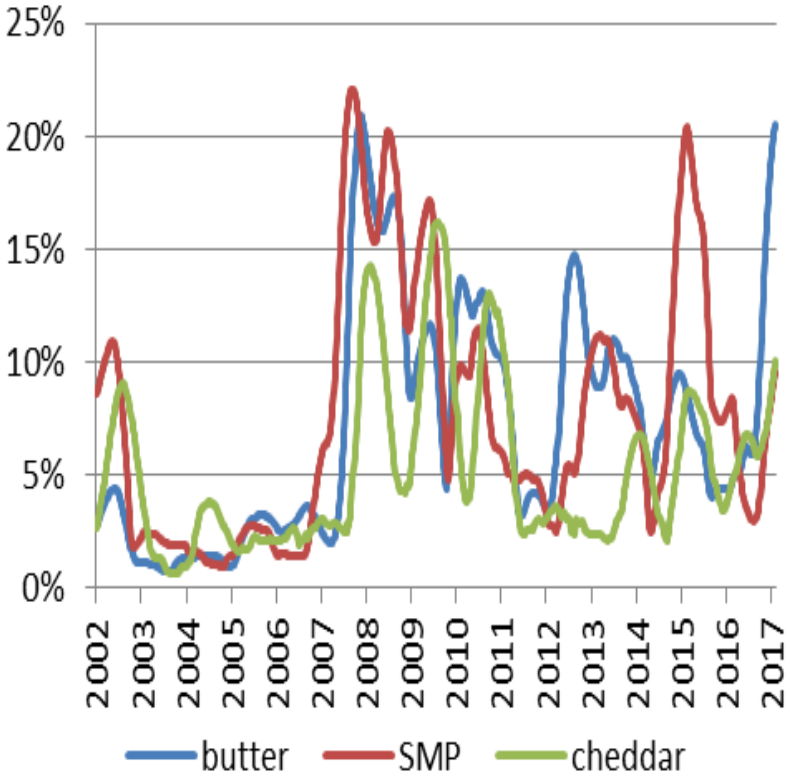
EU and world milk prices



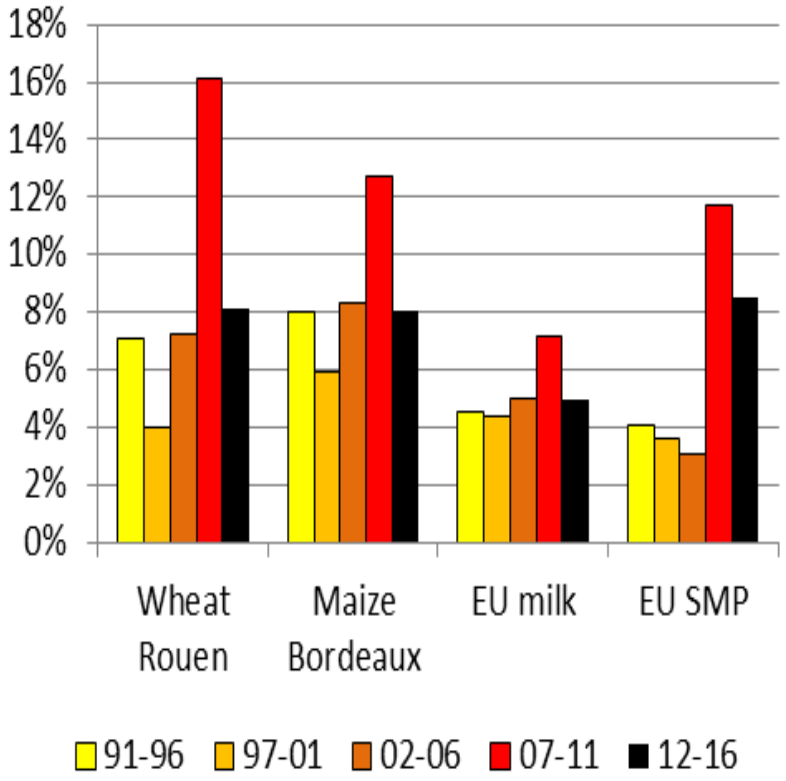
Source: DG Agriculture and Rural Development calculations

EU dairy volatility (1-y CoV): products comparison

Dairy products…



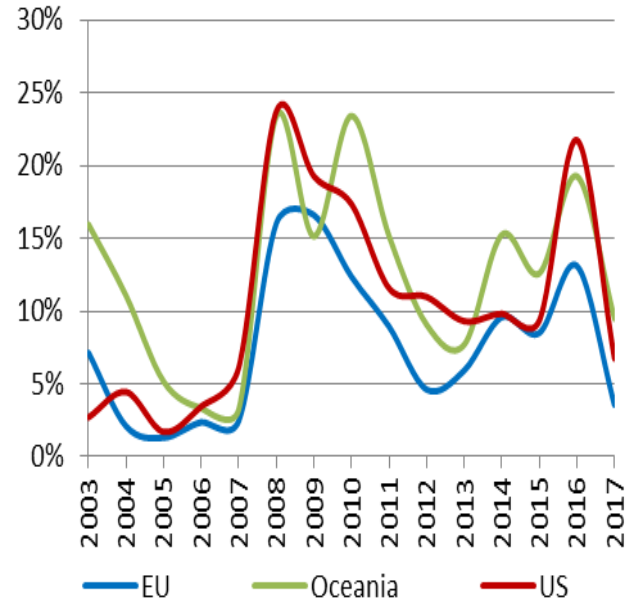
…and crops



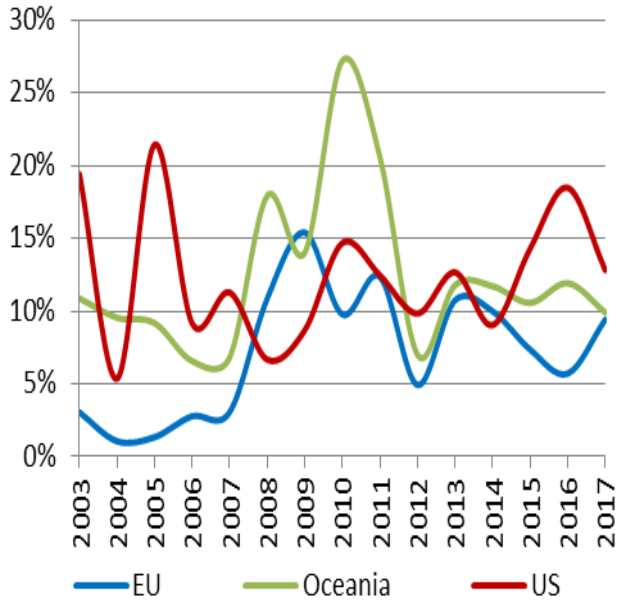
Source: DG Agriculture and Rural Development calculations

Dairy volatility: geo comparison

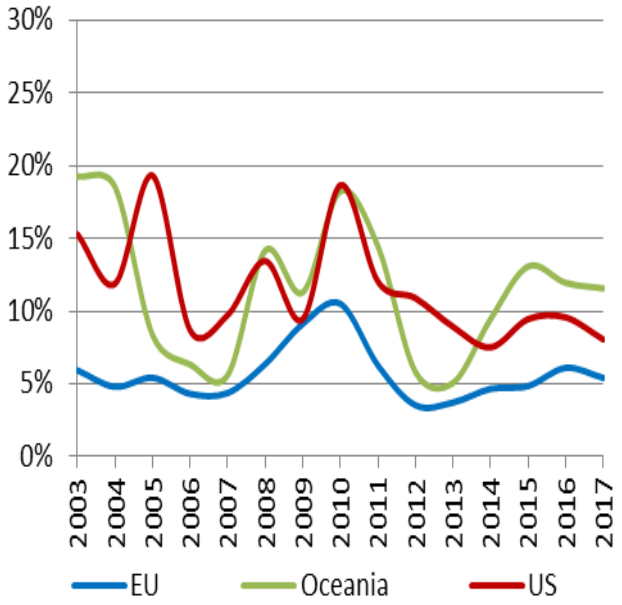
SMP



Butter



Raw milk



Source: DG Agriculture and Rural Development calculations

Financial instruments

Forward contract

A forward contract is a contract between two parties to buy (or sell) an asset at a specified future time at a price agreed upon today, typically traded Over-The-Counter (OTC).

Future contract

Futures are standardised (by quality, quantity, delivery date etc…) forward contracts centralized/negotiated at Exchanges. Futures can be based on physical delivery of the underlying asset or on cash-settlement, i.e. by only making a payment in cash when the contract expires, without physical exchange of goods.

Option contract

An option gives the buyer the right, but not the obligation, to buy or sell an underlying asset: the purchase, if the option is exercised, happens at a pre-specified strike price on a pre-specified maturity date. Important asymmetry: the seller of the option has the corresponding obligation to fulfil the transaction (to sell or buy) if the buyer exercises the option.

Financial dairy products available, worldwide

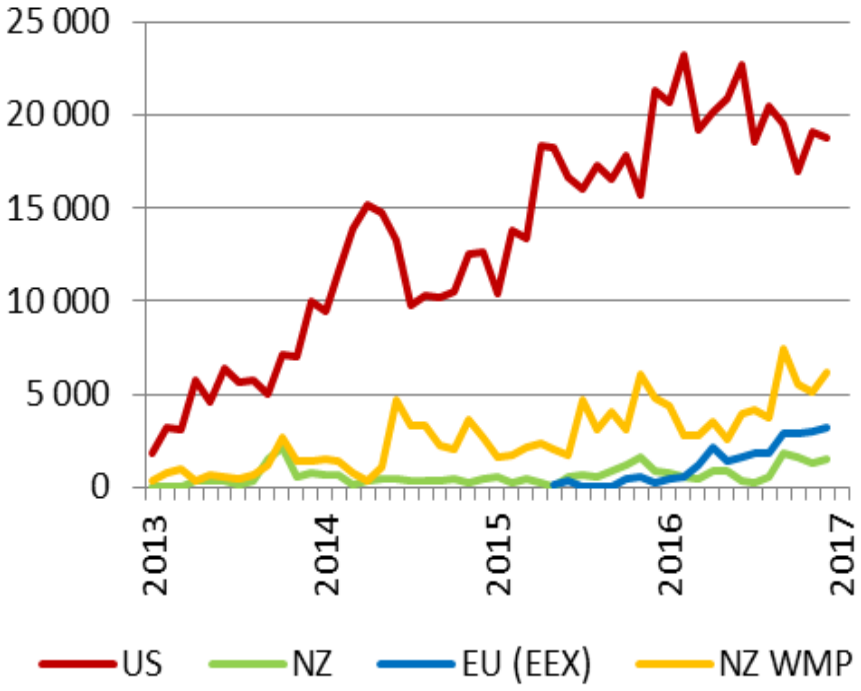
Colour code: orange means physical delivery, light-blue is cash-settled, dark-blue is cash-settled with options available.

	Milk Class III	Milk Class IV	Milk MKP	Butter	Butter oil, AMF, Anhydrous Milk Fat	SMP	WMP	Standard Whey Powder	Cheddar Cheese
New Zealand (USD)			6 000 kg milk solid, yearly (5y) 2016	1 t 18 months 2014	1 t 18 months 2011	1 t 18 months 2011	1 t 18 months 2010		
US (USD)	90 t 24 months 2000	90 t 24 months 2000		9 t 24 months 2005		20 t 24 months 1993		20 t 24 months 2007	9 t 24 months 2010
EU EEX (EUR)				5 t 18 months 2015		5 t 18 months 2015		5 t 18 months 2015	
EU Euronext (EUR)				6 t 18 months 2015		6 t 18 months 2015		6 t 24 months 2015	

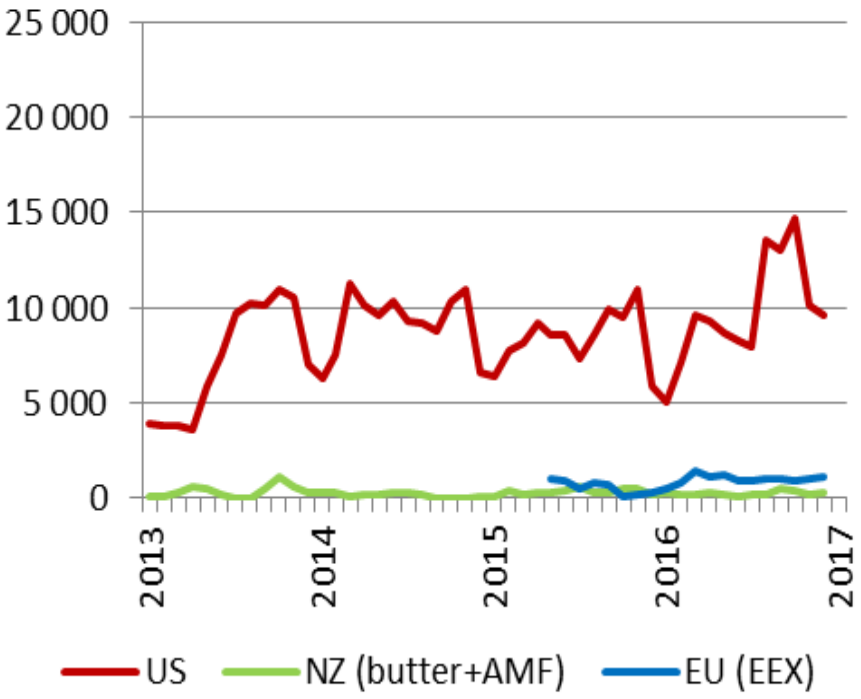
Source: Euronext, EEX, CME, NZX.

Open interest (nearby future, converted into tonnes)

SMP



Butter



Source: DG Agriculture and Rural Development based on Thompson Reuters

Use of dairy futures: larger in the US than in the EU

Share of open interest over production

	2012	2013	2014	2015	2016
EU SMP				0.2%	0.9%
US SMP	3.0%	3.8%	8.0%	11.6%	12.1%
NZ SMP	0.1%	0.7%	0.2%	0.7%	1.1%
NZ WMP	0.3%	0.3%	0.5%	1.1%	1.5%
EU butter				0.1%	0.2%
US butter	4.6%	5.1%	6.3%	6.6%	6.4%
NZ butter	1.7%	0.7%	0.3%	0.7%	0.7%
US milk	2.8%	2.6%	3.8%	3.5%	3.4%
US cheese	1.3%	1.2%	2.8%	4.9%	4.6%

Source: DG Agriculture and Rural Development based on Thompson Reuters and USDA PSD

Use of dairy futures: increasing trend

Share of open interest over production

Colours line by line

⚠	2012	2013	2014	2015	2016
EU SMP				0.2%	0.9%
US SMP	3.0%	3.8%	8.0%	11.6%	12.1%
NZ SMP	0.1%	0.7%	0.2%	0.7%	1.1%
NZ WMP	0.3%	0.3%	0.5%	1.1%	1.5%
EU butter				0.1%	0.2%
US butter	4.6%	5.1%	6.3%	6.6%	6.4%
NZ butter	1.7%	0.7%	0.3%	0.7%	0.7%
US milk	2.8%	2.6%	3.8%	3.5%	3.4%
US cheese	1.3%	1.2%	2.8%	4.9%	4.6%

Source: DG Agriculture and Rural Development based on Thompson Reuters and USDA PSD

Use of futures for crops: another planet…

Share of open interest over production

	2012	2013	2014	2015	2016
EU wheat	11%	8%	8%	9%	10%
US wheat	100%	95%	96%	97%	95%
US maize	56%	43%	45%	48%	44%
US soybeans	111%	85%	82%	87%	83%
EU rapeseed	21%	14%	13%	17%	19%

Source: DG Agriculture and Rural Development based on Thompson Reuters and USDA PSD

Use of futures for crops: stable in the EU

Share of open interest over production

Colours line by line

	2012	2013	2014	2015	2016
EU wheat	11%	8%	8%	9%	10%
US wheat	100%	95%	96%	97%	95%
US maize	56%	43%	45%	48%	44%
US soybeans	111%	85%	82%	87%	83%
EU rapeseed	21%	14%	13%	17%	19%

Source: DG Agriculture and Rural Development based on Thompson Reuters and USDA PSD

Trade of futures: again totally different pattern

Ratio among trade volume and open interest

	2012	2013	2014	2015	2016
Wheat EU	2.2	2.4	2.8	2.6	2.6
Rapeseed EU	1.9	2.6	2.4	2.4	2.8
Wheat US	5.1	5.1	5.5	6.5	5.9
Maize US	5	4.5	4.5	5.2	5.4
Soybeans US	6.4	6.8	6.4	6.6	7.2
SMP EU				0.8	0.3
Butter EU				0.4	0.4
SMP US	0.3	0.5	0.6	0.7	0.7
Butter US	0.3	0.5	0.5	0.4	0.5
Milk III US	0.9	1.1	0.9	0.7	0.8
Milk IV US	0.2	0.5	0.3	0.4	0.3
Cheese US	0.3	0.4	0.4	0.3	0.3
SMP NZ			1	0.7	0.4
WMP NZ	0.4	0.4	0.7	0.7	0.6
Butter NZ				0.8	0.7
AMF NZ			0.9	0.6	0.5

Source: DG Agriculture and Rural Development based on Thompson Reuters

How hedging works in practice

- ***FOR THE BUYER:*** *a hedging strategy on a* ***long position*** *is rather easy. The owner of a contract will buy in the future (precisely at maturity) the underlying asset at a price known today.*

- ***FOR THE SELLER:*** *viceversa, a hedging strategy on a* ***short position*** *could be slightly more complicated...*
In growing order of complexity, we go through a series of

- ***WORKED EXAMPLES:*** *'today' is the negotiation day, explicitly stated, around Aug-Sep 2016. Maturities have been selected for particular intrinsic interest: May 2017 for the next seasonal peak in production, and December 2016 for a complete ex-post evaluation.*

- ***REAL MARKET DATA:*** *figures quoted are rounded to make them more readable*.

Example 1, "the locker"

- ***TARGET:*** *a dairy processor wants to secure his revenue for selling 5 t of SMP by fixing the selling price of his dairy commodity in advance.*

- ***MARKET DATA:*** *on the* ***9th of September 2016*** *the EU market price for SMP is 1 900 EUR/t. On the same day, these are the prices of SMP contracts:*

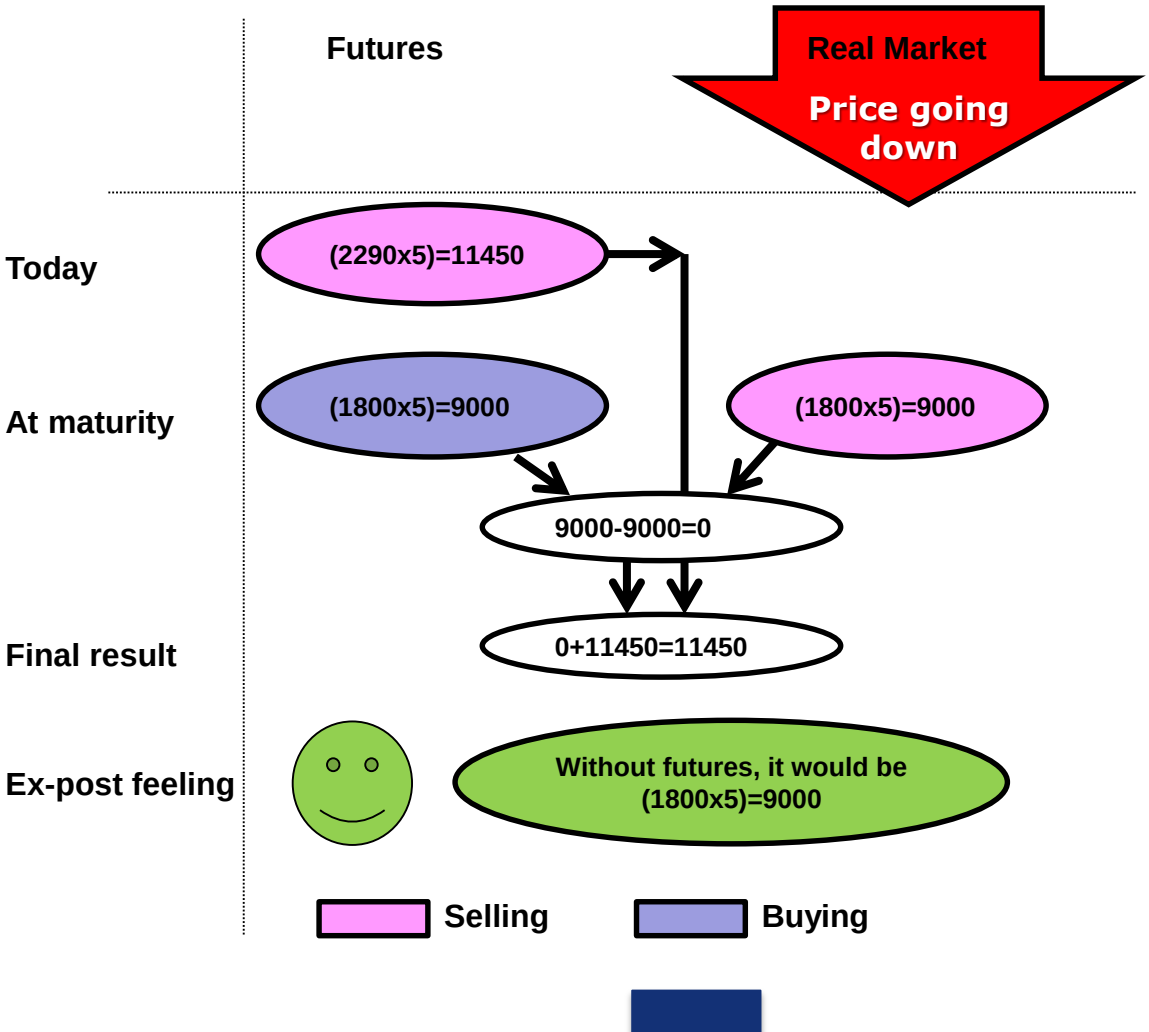
Maturity	Sept 2016	Oct 2016	Nov 2016	May 2017
SMP (EUR/t)	2 090	2 140	2 130	**2 290**

Source: EEX.

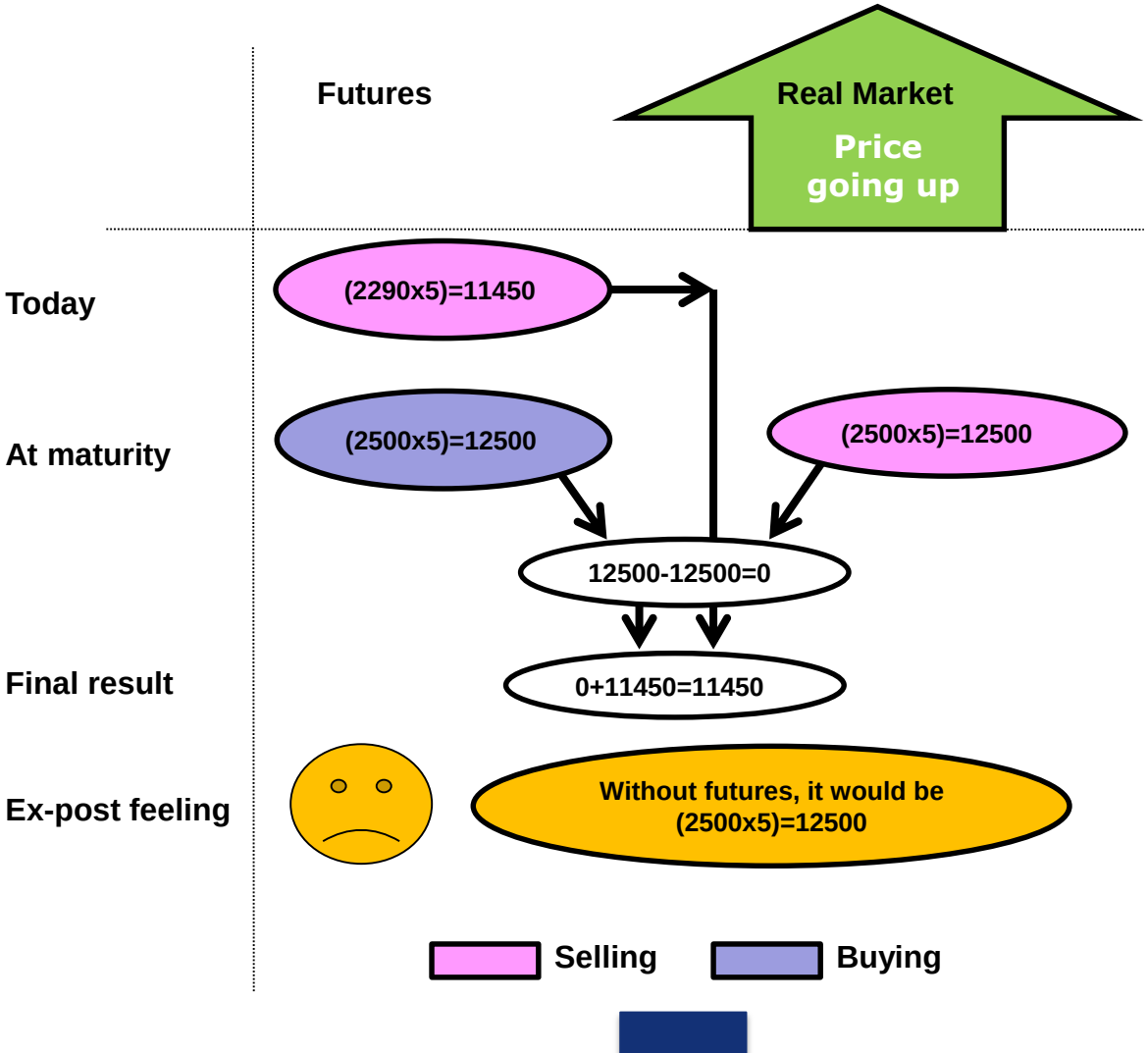
- ***HEDGING STRATEGY:*** *regardless of the physical price today, the processor* ***sells today a contract of SMP*** *with expiry date May 2017.* ***At maturity, the processor physically sells his SMP*** *on the physical market,* ***AND buys back the SMP contract*** *at market price, thus cancelling the previous commitment (i.e. netting his 'financial' position).*

- ***2 SCENARIOS:*** *"up" from 1 900 EUR/t today to 2 500 EUR/t* ***(+600 EUR/t****), and "down" from 1 900 EUR/t today to 1 800 EUR/t* ***(-100 EUR/t****).*

Example 1, "the locker": scenario "down"



Example 1, "the locker": scenario "up"



Wrap up: Example 1, "the locker"

Whatever the future outcome on the market *(scenario 1 assumes an increasing price while scenario 2 assumes a decreasing one),* ***the net final result in both cases is exactly the initial value of the futures contract****, an amount already known since the beginning (EUR 11 450).*

This is exactly what ***'securing revenues'*** *means: the original target of the processor was exactly to have a known and* ***market-evolution-unrelated guaranteed price****.*

The hedging strategy works perfectly, provided that:

- *at maturity futures contract price and spot price* ***converge****;*
- *the underlying price of the futures contract is a* ***'representative price'****, really reflecting the specific spot market's conditions.*

Example 2, the "shock absorber"

- ***TARGET:*** *a cooperative is selling raw milk but since there is no milk futures contract in Europe it has to hedge on dairy products such as butter and SMP.*

- ***MARKET DATA:*** *on the* ***14th of August 2016*** *the EU market price for SMP and butter is respectively 1 780 EUR/t and 3 290 EUR/t. On the same day, these are the prices of SMP and butter contracts:*

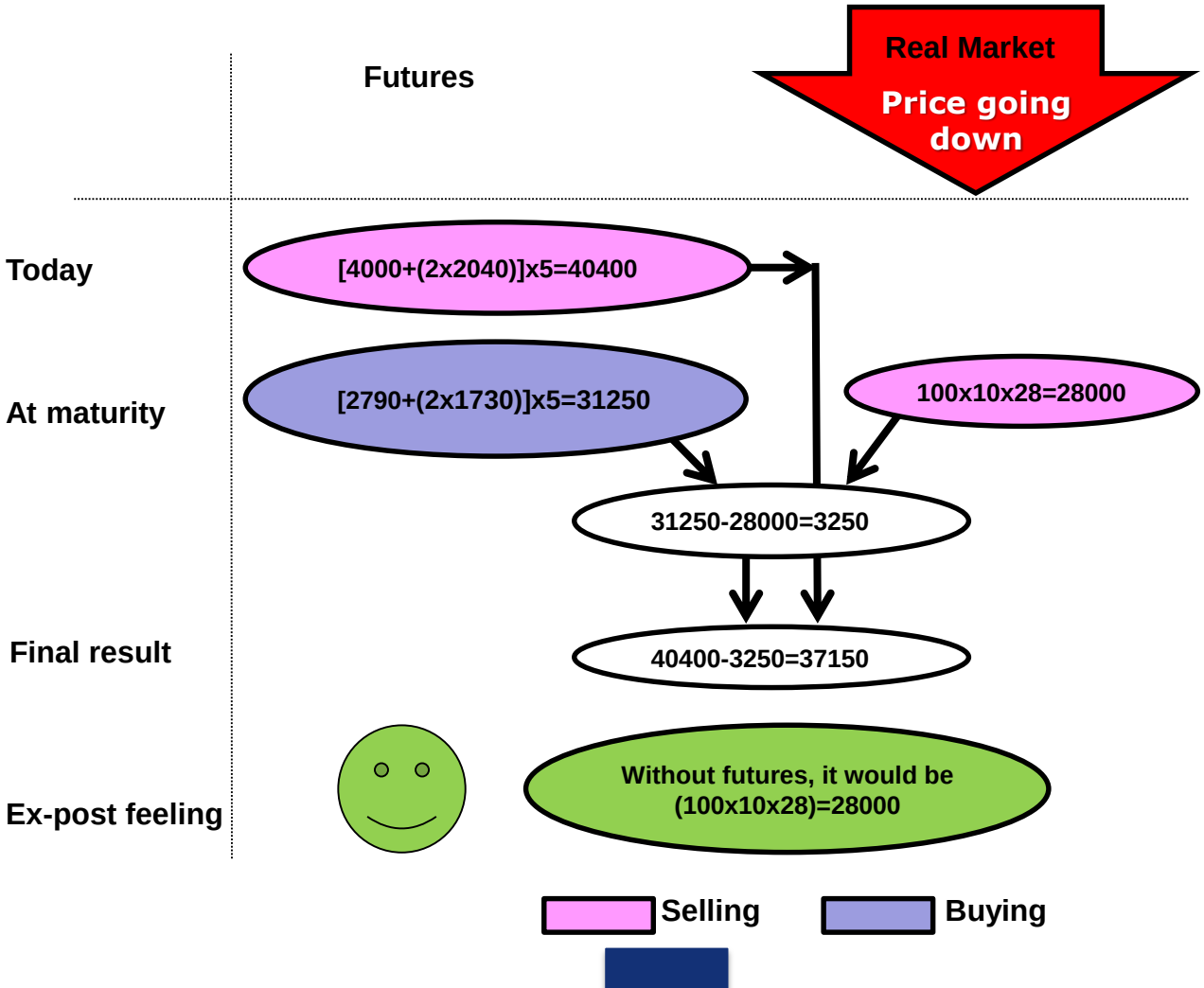
Maturity	Sept 2016	Oct 2016	Nov 2016	Dec 2016
SMP (EUR/t)	1 940	2 000	2 020	**2 040**
Butter (EUR/t)	4 100	3 990	3 960	**4 000**

Source: EEX.

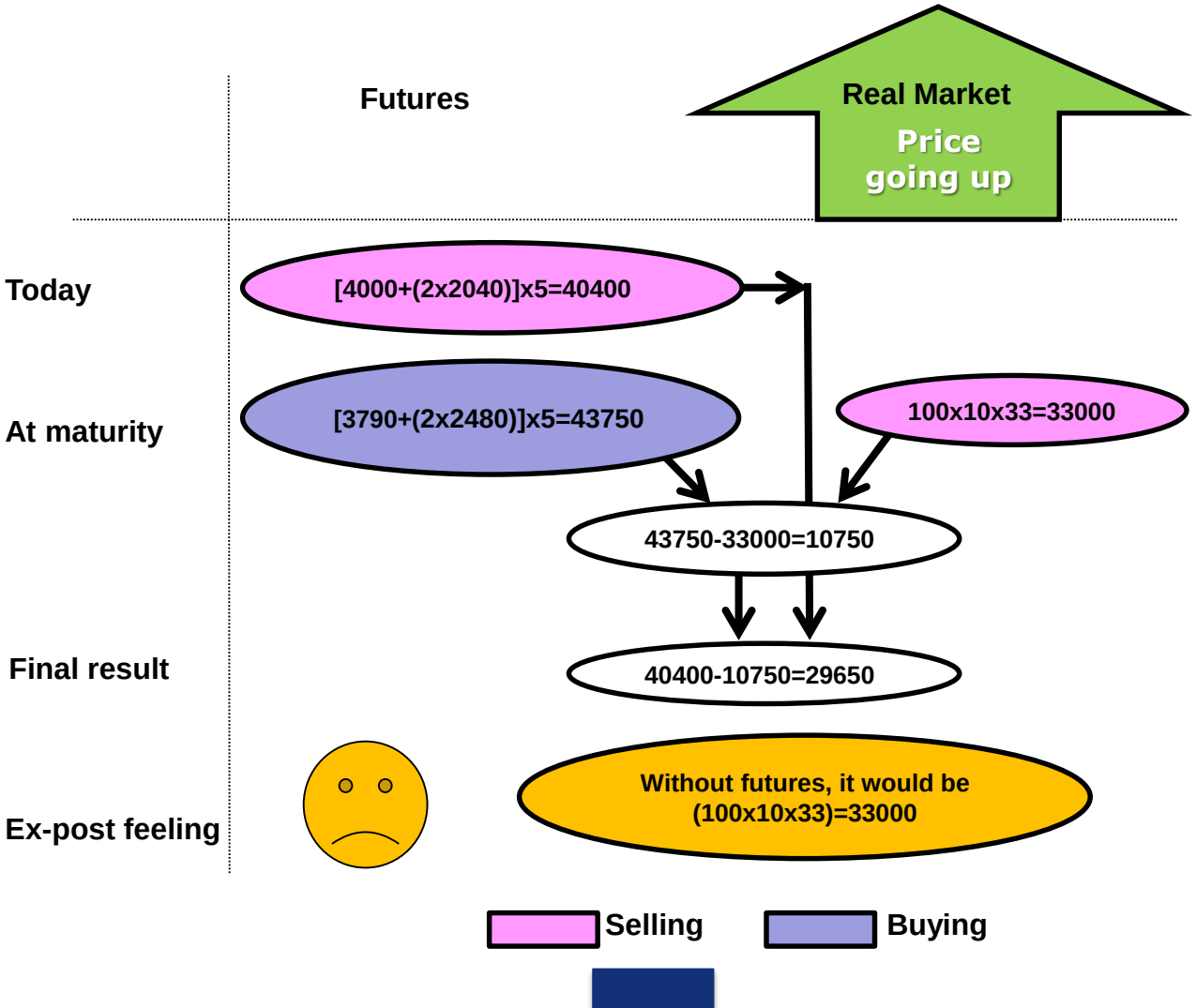
- ***HEDGING STRATEGY:*** *regardless of the physical price today, the cooperative* ***sells today a portfolio made of 1 contract of butter and 2 contracts of SMP*** *at December prices.* ***At maturity****, the cooperative* ***sells its milk production*** *according to prevalent market condition* ***and buys back the portfolio*** *(1 contract of butter and 2 of SMP) at market prices, thus cancelling the previous commitment.*

- ***2 SCENARIOS:*** *"up" and "down" for both SMP and butter.*

Example 2, "shock absorber": scenario "down



Example 2, "shock absorber": scenario "up"



Wrap up: Example 2, the "shock absorber"

Whatever the future outcome on the market *(scenario 1 has increasing prices while scenario 2 has decreasing ones),* ***the net final result*** *in both cases* ***is not too far from 33 EUR/100 kg*** *(i.e. the expected future milk value implied by the December contracts on SMP and butter), an amount already known today.*

This is exactly what ***'protect revenues'*** *means: the original target of the processor was exactly to have a known and* ***market-evolution-softened guaranteed price****.*

The hedging strategy works perfectly, provided that:

- *at maturity futures contract price and spot price* ***converge****;*
- *the underlying price of the futures contract is a* ***'representative price'****, really reflecting the specific spot market's conditions.*

Example 3, "the button": scenario "up"

	Options	Real Market: Price going up
Today	35.5x20=710	
At maturity	2070x20=41400 (crossed out)	2450x20=49000
Final result	49000-710=48290	
Ex-post feeling		Selling price just slightly below the market price

Selling Buying

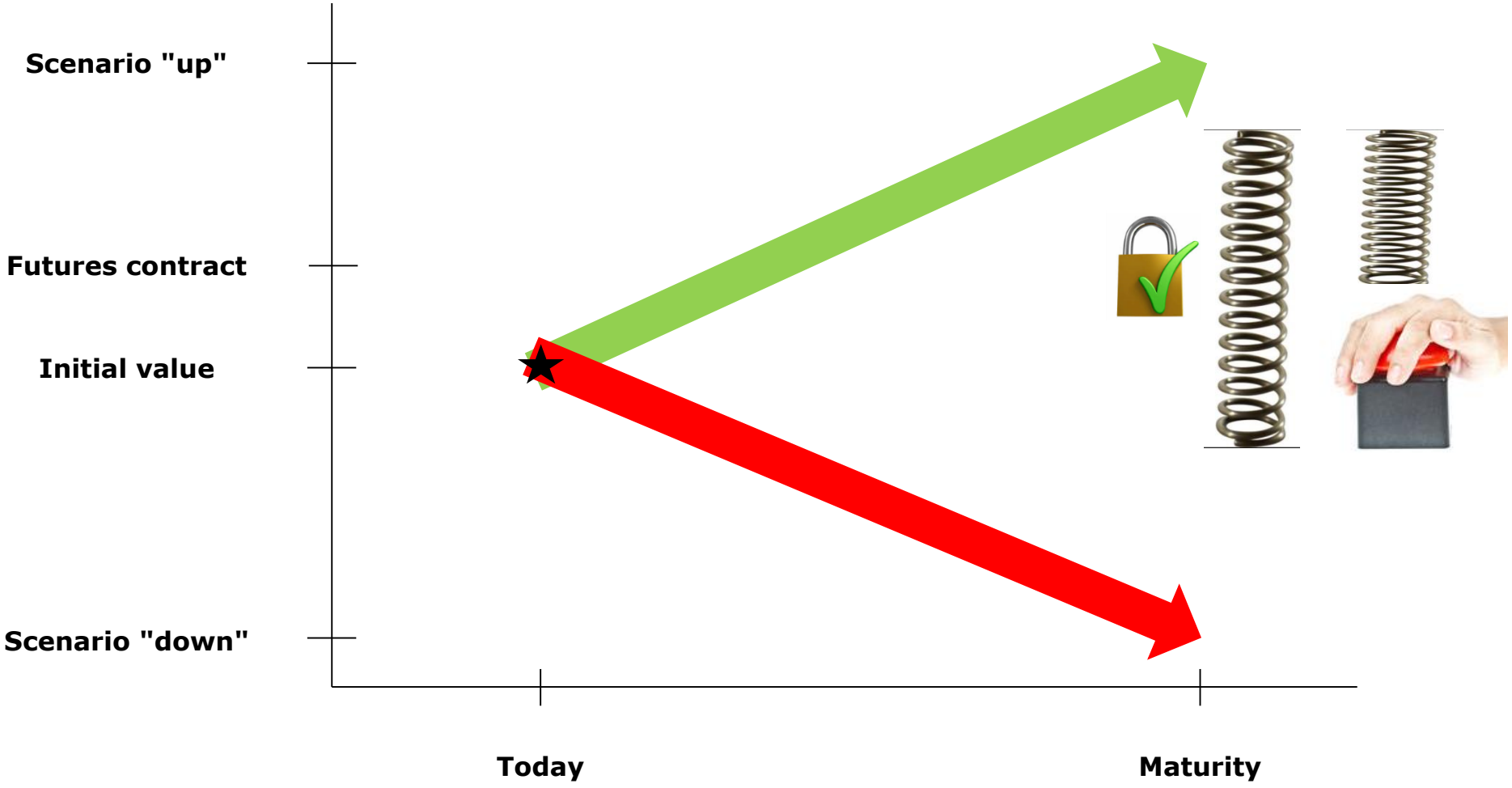
Example 3, "the button": scenario "down"

	Options	Real Market: Price going down
Today	35.5x20=710	
At maturity	2070x20-37000=4400	1850x20=37000
Final result	4400+37000=41400	
	41400-710=40690	
Ex-post feeling	Selling price well above the market price	

Selling

Buying

Wrap up: "locker", shock absorber" and "button"



Conclusions

- *Volatility of dairy products prices is significantly higher than the historical level of the early 2000s (though lower than in 2007).*
- *Financial tools, such as futures and options could really contribute to reduce risks for dairy farmers/processors, especially in times characterized by relatively high volatility and low prices.*
- *Specific futures for dairy markets have recently been introduced in the EU. The volumes traded are still low but a growing interest for these contracts is observed, especially by the end of 2016.*
- *In the dairy sector, cash-settled contracts may be more suited rather than physical delivery contracts.*
- *In the US, where dairy futures have been available for a longer period, the open interest (number of open contracts) for SMP represents 12% of the domestic production. The open interest for SMP in EU futures is significantly increasing but only close to 1% of the EU production.*

Main obstacles

Several obstacles are reported to affect the expansion and the use of futures and options in the dairy sector:

- *dairy products are not as homogenous as grains/crops;*
- *liquidity is still low;*
- *the amount of knowledge required to handle these instruments is high, and lacking in the sector.*

Other obstacles to the growth of future markets

- *High transaction/intermediation/brokerage cost, plus margin calls*
- *Public support policies providing alternative methods of risk reduction*
- *Local prices are not strongly correlated with world or EU futures prices*
- *Convergence of spot and futures prices*

More specifically on dairy

- *Size of contracts, too large for a single farmer*
- *Physical delivery vs cash-settled contracts*
- *Lack of a "Representative Price"*
- *Still perceived as speculative tools…*

Final key message

Many of the issues are already (on the way to be) solved or clearly reduced in impact. On the production side, cooperatives and producer organisations could play a crucial role, centralizing hedging thus reducing the burden for individual farmers.